ERDC/CERL SR-08-7

US Army Corps
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Engineer Research and
Development Center

Center for the Advancement of Sustainability Innovations (CASI)

A Summary of the Center's First Year's Activities

William D. Goran

May 2008

Construction Engineering
Research Laboratory

ERDC/CERL SR-08-7
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Final Report

Prepared for U.S. Army Corps of Engineers
Washington, DC 20314-1000

Abstract: The Engineer Research and Development Center (ERDC) established the Center for the Advancement of Sustainability Innovations (CASI) as a new capability in fall 2006 to be hosted at the Construction Engineering Research Laboratory (CERL) in Champaign, IL. The goal of CASI is to focus the value of ERDC expertise, technologies, and partnerships on helping the U.S. Army Corps of Engineers (USACE), the Army, and the Department of Defense (DoD) achieve more sustainable facilities and operations. Sustainability innovations from CASI and its partners are measured against the Army Strategy for the Environment's "triple bottom line," of mission, community, and environment. CASI has organized technology focus areas involving domains for which to provide capabilities and expertise relevant to sustainability requirements. In 2007, CASI focused on building relationships and attempting to identify those critical projects that will help shape future Army and USACE activities. This report describes some of these collaborations and details plans for 2008.

Contents

Preface

This publication covers a number of studies and workshops that were planned, managed or facilitated by the new ERDC Center for the Advancement of Sustainability Innovations (CASI). The work described was managed by the CASI Director, William D. Goran, with assistance of the CASI Associate Director, Michelle Hanson.

CERL is an element of the U.S. Army Engineer Research and Development Center (ERDC), U.S. Army Corps of Engineers. The Commander and Executive Director of ERDC is COL Richard B. Jenkins, and the Director of ERDC is Dr. James R. Houston.

1 Introduction

Background

The Engineer Research and Development Center (ERDC) established the Center for the Advancement of Sustainability Innovations (CASI) as a new capability in fall 2006 to be hosted at the Construction Engineering Research Laboratory (CERL) in Champaign, IL. CASI's goal is to focus ERDC expertise, technologies, and partnerships to help the U.S. Army Corps of Engineers (USACE), the Army, and the Department of Defense (DoD) to achieve more sustainable facilities and operations. CASI aims to contribute toward the objective stated in the Association of the U.S. Army Torchbearer (February 2007) entitled "Sustaining the Mission, Preserving the Environment, Securing the Future," which holds that Army sustainability is a true combat and national security multiplier.

Sustainability innovations from CASI and its partners are measured against the "triple bottom line," as stated in the Army Strategy for the Environment (October 2004):

1. Benefit to organizational missions
2. Benefit to communities that help to support, and are impacted by, preparations for and the conduct of defense missions
3. Benefit to the environment.

To help organize ERDC and its partners' capabilities toward these goals, CASI has organized "technology focus areas" involving domains that can provide capabilities and expertise relevant to USACE, Army, and DoD sustainability requirements. Although additional areas are planned to be organized during 2008, the eight technology focus areas that were active during 2007 include:

- Anticipating Future Issues and Opportunities
- Sustainability Approaches, Education, and Knowledge Management
- Sustainable Regional Planning
- Sustainable Energy Solutions
- Sustainable Facilities and Infrastructure
- Sustainable Water Resources
- Ecosystem Services and Natural Capital
- Sustainable Forward Military Operations.

In 2008, activities are planned in the eight original focus areas, plus two additional ones:

- Sustainable Materials
- Climate Change Impacts on Agency Facilities and Missions.

In 2007, CASI focused on building relationships and attempting to identify those critical projects that will help shape future Army and USACE activities. Ideas from projects and activities come from multiple sources. Two very important forums for CASI's direction emerged as the CASI director and technology focus area leads participated in the Army Sustainability Council and the recently formed the USACE Sustainability Council. Many other concepts for projects come directly from USACE and Army plans, such as the draft Army Strategy for Sustainability.

CASI's 2007 efforts reflect significant opportunities and interested stakeholders. For example, CASI is partnering with the Army Environmental Policy Institute (AEPI), Army Research Office (ARO), and the Maneuver Support Center Directorate of Environmental Integration (MANSCENDEI) on developing a technology roadmap for sustainable forward operations. The center also partnered with the Office of the Secretary of Defense (OSD) Sustainable Ranges Program, Office of Economic Adjustment, AEPI, the Installation Sustainability Planning effort and others on developing regional "futures" analysis capabilities that extend the temporal and spatial horizons of stakeholder interactions with the military. These efforts and others described in this report are intended to fundamentally change DoD's future operations in ways that effectively support the triple bottom line of mission, community, and environment.

Objectives

The objective of this work is to summarize the primary activities of CASI during its first year of operations (fiscal year [FY] 2007), and plans for the upcoming year.

Approach

Researchers reported the status, progress, and accomplishments of the first year's principal CASI activities (projects, collaborations, forums, conferences, symposiums, workshops, or other CASI sponsored or involved events, and publications). Individual write-ups were reviewed, verified, organized into standardized format, and compiled into a single document.

Scope

Throughout 2007, ERDC and its partners participated in many forums and projects related to USACE, Army, and DoD sustainability beyond those reported in this document. The report narrowly focuses on efforts directly enhanced by CASI.

Mode of technology transfer

This report will be made accessible through the World Wide Web (WWW) at URL: http://www.cecer.army.mil

2 FY07 Projects, Activities, Forums, and Publications

Definition of terms

Projects are funded efforts conducted through CASI. Activities are collaborations that engage CASI with others. Forums are meetings, conferences, symposiums, workshops, and other events held through CASI or with CASI involvement. Publications may precede or result from a project, activity, or forum.

Anticipating future sustainability issues

Lead: William Goran, ERDC-CERL

Activity: William Goran participates as a member of the Foresight Consultative Team, which advises the Deputy Assistant Secretary of the Army for Environment, Safety and Occupational Health (DASA-ESOH) on emerging issues. This forum was established as part of the Army Strategy for the Environment to ensure that the Army is "looking forward" as it seeks to anticipate future sustainability issues. Other members of this team are from the U.S. Military Academy at West Point (USMA), Army War College, MANSCENDEI, ARO, and the Center for Environmental Management of Military Lands.

Each year, emerging issues are selected for briefings, Foresight Bulletins, and presentations at Army, DoD, and other forums as a way to engage stakeholders. Two topics were featured during 2007: (1) Ecosystem Services and Markets (March 2007), and (2) Climate Change (July 2007). During summer 2007, several additional emerging issues were identified:

- water supply for military bases (CONUS and OCONUS)
- role of the military in spreading and responding to global health threats (pandemics)
- micro-grids for full spectrum of military operations – from fixed facilities to forward basing and reconstruction
- regional planning beyond the fence line – in greater habitat and watershed areas (working with multiple stakeholders)
- sustainability knowledge sharing.

Sustainability approaches, education, and knowledge management

Lead: Michelle Hanson, ERDC-CERL

Project: Sustainability Measures and Benchmarks. This project aims to help Army stakeholders advance their sustainability goal-setting and evaluation by identifying opportunities, locating organizations for benchmark comparisons, and selecting appropriate measurement tools.

ERDC POC: Michelle Hanson, michelle.j.hanson@usace.army.mil, 217-373-3389
Team Members: David Krooks, Stuart Foltz, James Westervelt, Chris Rewerts.
Sponsor: David Sheets, AEPI.
Collaboration: Shannon Lloyd and David Eady, Concurrent Technologies Corporation (CTC).

Sustainable regional planning

Lead: Dr. James Westervelt, ERDC-CERL

Website: https://eko.usace.army.mil/fa/serm/

Project: Strategic Sustainability Assessment (AEPI, University of Illinois). This project investigates sustainable planning for Fall Line (Fort Bragg to Fort Benning) bases and neighbors.

ERDC POC: Elisabeth Jenicek, Elisabeth.M.Jenicek@us.army.mil, 217-373-7238
Collaborators: CTC, Ecologix Group, The Pertan Group, University of Illinois at Urbana-Champaign (UIUC), and the UIUC Land Evaluation and Use Model (LEAM) Lab: http://www.leam.uiuc.edu/leam/
LEAMGroup, Inc. Sponsor: Karen Baker and John Fittipaldi, AEPI.

Project: Phase I: Southeast Regional Partnership for Planning and Sustainability (SERPPAS). This project investigates sustainable planning issues in a selected region (Fort Benning to Eglin Air Force Base [AFB] corridor) of the southeast.

Sponsor: OSD Sustainable Ranges, Jan Larkin.
SERPPAS website: http://wrrc.p2pays.org/serppas/index.asp
ERDC POC: James Westervelt, James.D.Westervelt@us.army.mil, 217-373-4530
Partnership: Will Allen, The Conservation Fund.

Project: Southwest Sustainable Planning (Desert Research Institute [DRI] and OSD Sustainable Ranges). This project investigates sustainable planning for Nellis AFB/Las Vegas, Yuma, AZ, and California border area.

DRI: http://www.dri.edu/
ERDC POC: Alan Anderson, Alan.B.Anderson@usace.army.mil, 217-373-7233
Collaborators: David Mouat, DRI.
Sponsor: Jan Larkin, OSD Sustainable Ranges Program.

Sustainable energy solutions

Lead: Dr. Thomas Hartranft, ERDC-CERL

Website: http://www.cecer.army.mil/td/tips/product/details.cfm?ID=1004

Project: Energy Micro-Grid Design for Fort Sill, OK, with Sandia National Lab (Energy and Infrastructure Assurance):
http://www.sandia.gov/mission/energy/index.html

ERDC POC: Tarek Abdullah, Tarek.Abdullah@usace.army.mil, 217-373-4432
Roch Ducey, Roch.Ducey@us.army.mil, 217-373-6760.
Collaborator: Sandia National Lab. Sponsor: Department of Energy.

Activity: This team collaborated with the Strategic Environmental Research and Development Program (SERDP) and National Renewable Energy Lab (NREL) to develop Statement of Need (FY08 project) on micro-grid controls/storage.

ERDC POCs: Thomas Hartranft and Roch Ducey,
Roch.A.Ducey@usace.army.mil, 217-373-6760
SERDP POC: John Hall.
Website: www.serdp.org

Publication: Roch Ducey and William Goran drafted an article entitled "Potential Military Applications of Energy Micro-Grids" for October 2007 publication in *Environmental Management* Magazine.

Sustainable facilities and infrastructure

Lead: Richard Schneider, ERDC-CERL

Websites:

- USACE Sustainable Design: https://eko.usace.army.mil/fa/sdd/
- Leadership in Energy and Environmental Design (LEED). U.S. Green Building Council: http://www.usgbc.org/

Activity: Richard Schneider, Richard.L.Schneider@usace.army.mil, 217-373-6752, participated in U.S. military exchange with China related to construction of a sustainable Chinese military academy.

Sponsor: William Van Houten, OSD-ATL.

Activity: This work upgraded and added new materials for the USACE *Sustainable Development* and *Design (SDD)* website.

ERDC POC: Annette Stumpf, Annette.L.Stump@usace.army.mil, 217-373-4492,
Sponsors: Harry Goradia (HQUSACE) and John Scharl (Assistant Chief of Staff for Installation Management [ACSIM]).

Forum: This team conducted a workshop on "Sustainable Design" using U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) standards at Fort Hood, TX, in July 2007.

ERDC POCs: Richard Schneider and Annette Stumpf.

Publication: This team published the ERDC-CERL Technical Report (ERDC/CERL TR-07-15), *DoD Sustainability Application Guide for Historic Properties*, which applies LEED-EB (Existing Building) Version 2.0 to Historic Buildings, and which provides specific discussion and strategies relevant both to historic preservation and sustainable design and development. This report is accessible through URL:

http://www.cecer.army.mil/techreports/ERDC-CERL_TR-07-15/ERDC-CERL_TR-07-15.pdf

ERDC POC: Julie Webster, Julie.L.Webster@usace.army.mil (217-373-6717).
Sponsor: LEGACY.

Draft Publication: This team authored a Draft ERDC-CERL Technical Report, *LEED for Homes – Pilot Study* - Evaluation *for Use in Army Family Housing*, which describes a LEED-H Pilot project evaluation of Army Family Housing at Fort Lee, VA and Fort Huachuca, AZ.

ERDC POCs: Richard Schneider, Richard.L.Schneider@.usace.army.mil 217-373-6752 and Annette Stumpf, Annette.L.Stumpf@usace.army.mil 217-373-4492.
Sponsor: Mr. Paul Christensen, ACSIM.

Sustainable water resources

Lead: Kathleen White, Cold Regions Research and Engineering Lab (ERDC-CRREL)

Publication (pre-publication): This team drafted a white paper (August 2007) for SERDP, AEPI, and HQUSACE on water supply for military bases and potential technologies to stretch available water use.

POCs: William Goran, Hany Zaghloul and Natalie Myer, ERDC-CERL.

Ecosystem services and natural capital

Lead: William Goran, ERDC-CERL

Publication (pre-publication): This team authored a white paper (December 2006) as a background document for AEPI's Foresight bulletin entitled *Emerging Ecosystem Services and Markets* (March 2007). AEPI Foresight issues: http://www.aepi.army.mil/foresight.html

ERDC POC: William Goran, William.D.Goran@us.army.mil, 217-373-6735.
Sponsor: John Fittipaldi, AEPI.

Sustainable forward military operations

Lead: Deborah Curtin, ERDC-CERL

Activity: This team served as advisors on the Environmental Intelligence Portal, a project of AEPI and the National Defense Center for Environmental Excellence (NDCEE), to gather environmental data for planning and assessment in forward operations (June 2007).

POCs: William Goran and Deborah Curtin.
Sponsor: Steve Hearne, AEPI. Collaborator: Roger Morin, morinr@ctc.com.

Forum: This team collaborated with the ARO Environmental Sciences Program (http://www.arl.army.mil/www/default.cfm?Action=29&Page=188) and North Carolina State University on a workshop entitled "Technology Approaches for Cur-

rent and Future Base Camp Sustainability" at Raleigh, NC, 12-14 September 2007.

Purpose: To identify basic research needs to improve sustainable solutions for Army forward operations (basing, stability operations, re-construction).
Participants: William Goran and Deborah Curtin, ERDC-CERL.
Sponsor: Kurt Preston, ARO.

Forum: "Using Sustainability to Build Stability in Africa," Army War College (July 2007, first in a series of workshops planned).

Purpose: To help fashion sustainable approaches for the new Africa command.
Participant: William Goran, ERDC-CERL.
Sponsors: Steve Hearne, AEPI, and Kent Hughes Butts, Army War College.

3 FY08 Planned Projects, Activities, and Forums

Anticipating future sustainability issues

Lead: William Goran, ERDC-CERL

Activity: Foresight Initiative — CASI will continue to support the DASA-ESOH on emerging issues. During 2008, the forum will pursue topics identified in the July 2007 session. (Chapter 2 lists the topics.) CASI will have a role in developing background papers for some of these topics (e.g., water supply, regional engagement with outside the fence line stakeholders, and micro-grids). In addition, CASI will continue to help identify new issues that will shape work in 2009 and beyond.

Sustainability approaches, education, and knowledge management

Lead: Michelle Hanson, ERDC-CERL

Proposed Project: European/U.S. Comparisons: Military Sustainability Approaches (proposed for FY08). This project would perform an analysis of sustainability approaches and their effectiveness, with a focus on developing active exchanges between allied military organizations regarding sustainability goals, objectives, activities, and metrics for success.

ERDC POCs: William Goran and Michelle Hanson.
Sponsor: CASI tasks, AEPI.

Proposed Project: Sustainability Knowledge Sharing (proposed for FY08). This project would design and implement additional web collaboration and knowledge sharing capabilities for Army sustainability. These efforts will extend and complement the existing Army sustainability website: http://www.sustainability.army.mil/ with a focus on providing an easy environment for sharing and collaboration on sustainability approaches and innovations.

ERDC POC: Annette Stumpf.

Planned Forum: "German/U.S. Army Technical Exchange (Annex 5)," March 2008.

ERDC POC: Hany Zaghloul.

Sustainable regional planning

Lead: Dr. James Westervelt, ERDC-CERL

Website: https://eko.usace.army.mil/fa/serm/

Proposed Project: Sustainable Regional Planning Project - Southeast Fall Line Region and Hawaii, with NDCEE (http://www.ndcee.ctc.com/)

ERDC POC: Hany Zaghloul, Hany.H.Zaghloul@usace.army.mil, 217-373-3433.
Collaborators: David Eady, CTC.
Sponsor: Hugh Wolfe, Technology Office, Assistant Secretary of the Army for Installations and Environment.

Proposed Project: Phase II: SERPPAS — Sustainable Planning Issues in a Selected Region (Benning to Eglin corridor) of the Southeast.

Sponsor: OSD Sustainable Ranges Program, Jan Larkin. Southeast Regional Partnership for Planning and Sustainability (SERPPAS): http://wrrc.p2pays.org/serppas/index.asp
ERDC POC: James Westervelt, James.D.Westervelt@us.army.mil, 217-373-4530.
Partnership: Will Allen, The Conservation Fund.

Proposed Project: 2.0 Release of the Sustainable Installations Regional Resources Assessment (SIRRA) Tool.

Sponsor: USACE, Malcolm McLeod.
ERDC POC: Elisabeth Jenicek.

Sustainable energy solutions

Lead: Dr. Thomas Hartranft, ERDC-CERL

Website: http://www.cecer.army.mil/td/tips/product/details.cfm?ID=1004

Note: the following energy-related projects are all currently funded.

Planned Project: The Army Installation Management Command (IMCOM) is supporting energy analyses and audits at six European installations plus eight CONUS installations. ERDC will partner with DOE-Pacific Northwest National Lab (PNNL) and Huntsville Engineering and Support Center to conduct these audits. Typically, these efforts identify energy conservation initiatives yielding 10-20 percent energy savings per facility.

Planned Project: ACSIM plans to support the development of benchmarks for four Army building types (Dining Hall, Child Development Centers, Company Operations Facilities, and Army Reserve Center Facilities). ERDC is partnering with DOE-NREL and the American Society of Heating, Refrigeration, and Air-Conditioning Engineers (ASHRAE) to develop energy performance benchmarks and prescriptive technology listings that will reduce building energy consumption by 30 percent compared to current ASHRAE building standards. These new guidelines will be incorporated into USACE Model requests for proposals (RFPs) under the Military Construction (MILCON) Transformation initiative. ERDC completed three other building types in FY07 (Barracks, Maintenance Facilities, and Battalion Headquarters Buildings). USACE has already implemented the prescriptive technology guide lines into MILCON Model RFPs for these building types.

Planned Project: Starting in FY08, ERDC will orchestrate several Congressionally directed industry funding recipients on projects related to reduced energy use. Projects relate to "net zero" housing, distributed generation, and fuel cells.

Planned Project: With ERDC's assistance, ACSIM plans to support several energy saving/recovery demonstration efforts, including: (1) conversion of low-temperature geothermal heat into electricity rated at 250kW at Fort Polk, LA, (2) Building Integrated Photovoltaic System at Fort Huachuca, AZ, (3) Deployable-Renewable Energy Power Station at Fort Irwin National Training Center, CA, and (4) Gray Water Heat Recovery from barracks shower rooms at an installation to be determined.

Planned Project: CASI (ERDC-CERL) will support SERDP as technical monitor on a new micro-grid design project conducted by Virginia Tech entitled Modeling and Simulation of a Distributed Generator (DG) Integrated Intelligent Microgrid.

Potential Project: For these forward operating base (FOB) focused initiatives by both REF and RDECOM, there needs to be a CONUS clearing house to do "proof of concept" evaluations under controlled conditions for these renewable solutions for the Warfighter. This capability could be set up at any of the CONUS training ranges — Active, Guard, Reserve.

Activity: ERDC is actively collaborating with RDECOM and Rapid Equipping Force (REF) to identify Army requirements and mature power deliv-

ery architecture and energy sustainability for FOBs. Army and DOD have recognized this challenge and recently funded RDECOM for a $30M, 6-year program called "HI-POWER" (Hybrid Intelligent Power) which will result in a new micro-grid network architecture for power. It will enable seamless plug and play of multiples, from tactical generators, commercial generators, solar, wind, vehicles (DC power likely) and grid (or "pole") power. The most important feature of this program is that it has the potential (through right-sizing and efficient use of generators) to reduce fuel consumption by 40 to 60 percent and maintenance by over 20 percent.

ERDC provides consulting support to REF in both energy conservation and power delivery measures as REF is funding a number of contractors to deploy prototype capabilities in Iraq and Afghanistan in 6- to 18-month time windows. An example includes coating fabric tents with foam for thermal insulation; this has shown greater than 50 percent reduction in energy needed for air-conditioning. REF is also fielding early prototypes of wind and solar generation devices, although no logistics tail is currently being provided.

Planned Forum: ERDC is collaborating DOE-PNNL to plan and orchestrate a 1-day Renewable Energy forum as part of IMCOM's semi-annual Energy Summit series. IMCOM Deputy Director BG John A. Macdonald is scheduled to chair this important session in December 2007.

Planned Forum: ERDC-CERL will provide one of four speakers presenting talks on "Energy Research at DoD" on 10 December 2007, at the monthly forum entitled "Energy: A Conversation About Our National Addiction in Washington, DC."

Sustainable facilities and infrastructure

Lead: Richard Schneider, ERDC-CERL

Websites:

- USACE Sustainable Design: https://eko.usace.army.mil/fa/sdd/
- Leadership in Energy and Environmental Design (LEED). U.S. Green Building Council: http://www.usgbc.org/

Proposed Project: LEED-ND (Neighborhood Development) Analysis – Policy and Design Implications. AEPI, USACE, and Installation Management Command (IMCOM) Master Planners.

ERDC POCs: Richard Schneider, Richard.L.Schneider@usace.army.mil, 217-373-6752, and Annette Stumpf, Annette.L.Stumpf@usace.army.mil, 217-373-4492.
Status: proposed for 2008 funding.
Sponsor: John Fittipaldi, AEPI.

Planned Projects: Army LEED Implementation:

- Construction Manager Training, Online and across the Corps
- Release of LEED-NC (New Construction) Army Implementation Guidance
- Complete Evaluation of LEED-EB for the Army
- Green Building Support for Sino-U.S. Military Environmental Protection Green Building Activities (China-U.S. Exchange)

ERDC POCs: Richard Schneider, and Annette Stumpf.
HQUSACE Sponsor: Harry Goradia.
ACSIM Sponsor: John Scharl.

Forum: Hispanic Engineer National Achievement Awards Conference (HENAAC) "Green Engineering Seminar," 10-12 October 2007, San Diego, CA.

Sponsor: Julio Arocho, HQUSACE Research and Development.
Presentations by William Goran with Harry Goradia, HQUSACE.

Planned Forum: "Joint Services Environmental Management (JSEM) Sustainability Track – Green Building 101 and Army LEED Implementation 101." Overview of how the Army is applying and implementing LEED.

ERDC POCs: Richard Schneider, Richard.L.Schneider@usace.army.mil 217-373-6752 and Annette Stumpf, Annette.L.Stumpf@usace.army.mil 217-373-4492.
HQUSACE
Sponsor: Harry Goradia.

Sustainable water resources

Lead: Dr. Kathleen White, ERDC-CRREL

Proposed Project: Issue/Policy Study of Water Requirements and Water Supply Projections for CONUS and OCONUS Army Bases over the Next Several Decades, with multiple scenarios for use requirements (including increased conservation measures) and for supply conditions. This work is planned for spring/summer 2008 (exact date not yet determined).

Sponsor: Michael Cain (David Sheets), AEPI.

Forum: The Nature Conservancy and USACE Partnering Workshop," Wheeling, WV, 1-4 October 2007.

Participant: William Goran, ERDC-CERL.

Proposed Forum: This forum will present technologies to "stretch" water resource supplies relevant to military bases and operations.

Sponsors: SERDP and ERDC.

Ecosystem services and natural capital

Lead: William Goran, ERDC-CERL

Planned Activity: This work will collaborate with Fort Bragg to develop sustainable energy solutions and their concept for an Energy Battle Lab (prototyping sustainable energy innovations).

Collaboration: Gay Kendall, U.S. Army Research, Development, and Engineering Command—Field Assistance in Science and Technology (RDECOM-FAST) Science Advisor, XVIII Airborne Corps and Fort Bragg, gay.kendall@us.army.mil, 910-396-2522.

Planned Forum: "Ecosystem Services and Natural Capital" workshop to be held at Eglin AFB, spring 2008.

Sponsor: SERDP, 703-696-2117, www.serdp-estcp.org.
Leader: Dr. John Wiens, Chief Scientist for The Nature Conservancy.
ERDC POC (organizing committee): William Goran.
Sponsor: SERDP Program Office, the Natural Capital Project; details are available through URL:
http://www.naturalcapitalproject.org/hawaii_prim.html

Publication: This team authored a Special Report, ERDC/CERL SR-08-4 *Provision of Ecosystem Services through Market-Based Approaches: Department of Defense Applications* (March 2008) by Elizabeth Keysar of CTC (http://www.ctc.com/) and William Goran, ERDC-CERL.

ERDC POC: Alan Anderson, Alan.B.Anderson@usace.army.mil, 217-373-7233.
Sponsor: William Goran, ERDC-CERL.

Sustainable forward military operations

Lead: Deborah Curtin, ERDC-CERL

Forum: Sustainable Concept of Operations (CONOPS)" workshop sponsored by AEPI and ERDC was held in Crystal City 6-7 November 2007.

Purpose: The purpose of this workshop is to begin development of short-, mid-, and long-term strategies for achieving sustainable forward operations as described in the draft Army Strategy for Sustainability. The cornerstone of strategy development is a technology investment roadmap identifying forward facility current state and gaps, accompanied by a Doctrine, Organization, Training, Materiel, Leadership, Personnel, and Facilities (DOTMLPF) analysis.
ERDC POC: Deborah Curtin, Deborah.R.Curtin@erdc.usace.army.mil, 217-398-5567.
Participants: Samuel Hunter, Gary Gerdes, Stuart Foltz, Annette Stumpf, Thomas Hartranft, and Susan Bevelheimer, ERDC-CERL.

Multi-Agency Advisory Forum Includes: ARO, OSD, Force Provider, U.S. Army, Europe (USAEUR), MANSCENDEI, and Center for Army Lessons Learned.

Forum: "Using Sustainability to Build Stability in Africa," Army War College (continuing series of workshops); a second workshop was conducted 2-4 October 2007.

Participant: Susan Enscore, ERDC-CERL.

Scheduled Forum: "SERDP Annual Symposium" (4-6 December 2007, Washington, DC). William Goran will chair a session on Sustainable Forward Basing.

Sponsor: SERDP Program, John Hall.
Participants: Kurt Kinnevan (DEI), Thomas Hartranft (ERDC), Steven Tucker (Natick Soldier Research, Development and Engineering Command), Michael Chapkovich (Naval Sea Systems Command, Environmental Systems), MAJ Thomas Timmes, Penn State University, and Kurt Preston, ARO.

4 New Focus Areas in FY08

Sustainable materials

Lead: Vicki Van Blaricum, ERDC-CERL

Potential Project: This work will support a potential future transport system concept through a Cooperative Research and Development Agreement (CRADA) with a private firm by investigating material and strength requirements for elevated towers necessary to support this transportation and security concept.

Activity: This work will develop a new basic research topic for ERDC (AT23 program) to identify and exploit material properties that help achieve sustainable practices (decrease removal of toxins from the earth, decrease use of non-renewable energy resources, decrease material requirements, and increase equity globally and across generations).

Climate change impacts on agency facilities and missions

Lead: William Goran, ERDC-CERL

Project: *Developing a Greenhouse Gas (GHG) Footprint for Fort Carson, CO*. Fort Carson, the NDCEE, and ERDC are developing the Army's first GHG footprint for an entire installation. The footprint is the combination of direct GHG emissions (originating within Fort Carson's boundary) and indirect emissions that are emitted outside the boundary, but are the result of activities at the installation (such as electricity purchases). Sequestration projects will also be addressed as part of the footprint. This effort is rooted in the existing Fort Carson Title V compliance database and emissions inventory contained in The Enviance System, an Environmental Management Information System being tested at Fort Carson and several other sites by the NDCEE. The protocols and procedures recommended by the World Resources Institute and other recognized organizations are being used as guidance for this effort. The Fort Carson Air Program staff is using the Enviance tool to develop the estimate, complete with the necessary calculations and reporting processes, for the GHG registries currently being considered by the Army.

POC: Deborah Curtin

Planned Forum: CASI is helping to establish an informal interagency forum addressing the issue of how changing temperatures, changing rainfall intensity and frequency, rising sea levels and other factors linked to climate change will impact agency capabilities. For DoD, there is language in the 2008 Defense Authorization Bill specifically related to this issue, and several agencies have already implemented processes to try to characterize their risks and potential adaptive responses. The forum is designed for agencies to learn from one another as they start to tackle this issue.

POCs: William Goran, ERDC-CERL, Timothy Hayden, ERDC-CERL, and Kathleen White, ERDC-CRREL.

5 Summary

During its first year of activity, CASI has been engaged with numerous collaborators in helping to identify and implement opportunities for USACE, the Army, and other military organizations to improve their "triple bottom line" of mission, community, and environment. This report describes some of these collaborations and details plans for 2008. While CASI is an ERDC initiative, the center's projects and activities are conducted with many other organizations and partnerships beyond ERDC in efforts to gather the best teams to address military sustainability challenges.

One project just getting underway will help Army stakeholders find "comparison or benchmark" sustainability efforts in industry and in foreign military organizations. This effort should also increase dialogue and collaboration between the U.S. military and these other organizations. Another proposed effort in 2008 will help the military understand how water needs, water supplies, and water use strategies might impact military operations and facilities over the next several decades as population growth, climate change, land use change, energy use, and other factors interact to complicate planning. During 2008, CASI also plans to partner with the Huntsville Installation Support Center of Expertise (ISCX) to identify potential sustainability advances in selected acquisition activities.

CASI's impacts relate to improvements in the sustainability of military operations. If those impacts in military and civil activities successfully reduce installations' environmental footprint and improve stakeholder and community relations, while maintaining and enhancing mission capability, then CASI will be contributing toward the goals articulated by U.S. military leadership to sustain the mission and secure the future.

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Acronyms and Abbreviations

Term	Spellout
ACSIM	Assistant Chief of Staff for Installation Management
AEPI	Army Environmental Policy Institute
AFB	Air Force Base
ANSI	American National Standards Institute
ARO	Army Research Office
ASHRAE	American Society of Heating, Refrigerating, and Air-Conditioning Engineers
AUSA	Association of the U.S. Army
BG	Brigadier General
CASI	Center for the Advancement of Sustainability Innovations
CEERD	U.S. Army Corps of Engineers, Engineer Research and Development Center
CERL	Construction Engineering Research Laboratory
CO	carbon monoxide
CONOPS	Concept of Operations
CONUS	Continental United States
CRREL	Cold Regions Research and Engineering Laboratory
CTC	Concurrent Technologies Corporation
DASA-ESOH	Deputy Assistant Secretary of the Army for Environment, Safety and Occupational Health
DG	Distributed Generator
DO	Dissolved Oxygen
DOD	Department of Defense
DoD	Department of Defense
DOE	U.S. Department of Energy
DOTMLPF	Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel, and Facilities
DRI	Desert Research Institute
EB	Existing Building
ERDC	Engineer Research and Development Center
ES	Electrical System
ESOH	Environment, Safety and Occupational Health
FOB	forward operating base
FY	fiscal year
GHG	greenhouse gas
HENAAC	Hispanic Engineer National Achievement Awards Conference
HQ	headquarters
HQUSACE	Headquarters, U.S. Army Corps of Engineers
ID	identification

Term	Spellout
IMCOM	Installation Management Command
ISCX	Installation Support Center of Expertise
JSEM	Joint Services Environmental Management
LA	load allocation
LEAM	Landuse Evolution Assessment Model
LEED	Leadership in Energy and Environmental Design
LEED-EB	LEED-Existing Building
LEED-H	LEED for Homes
LEED-NC	LEED-New Construction
LEED-ND	LEED Neighborhood Development
MANSCEN	Maneuver Support Center (MANSCEN)
MANSCENDEI	Maneuver Support Center Directorate of Environmental Integration
MILCON	Military Construction
NDCEE	National Defense Center for Environmental Excellence
NREL	National Renewable Energy Laboratory
NSN	National Supply Number
OCONUS	outside continental United States
OMB	Office of Management and Budget
OSD	Office of the Secretary of Defense
OSD-ATL	Office of Under Secretary of Defense for Acquisition, Technology and Logistics
PNNL	Pacific Northwest National Laboratory
POC	point of contact
RDECOM	Research, Development, and Engineering Command
RDECOM-FAST	U.S. Army Research, Development, and Engineering Command—Field Assistance in Science and Technology
REF	Rapid Equipping Force
SDD	Sustainable Design and Development
SERDP	Strategic Environmental Research and Development Program
SERM	Sustainability, Environment, and Room to Maneuver
SERPPAS	Southeast Regional Partnership for Planning and Sustainability
SIRRA	Sustainable Installations Regional Resource Assessment
SR	Special Report
TD	technical director
TNT	trinitrotoluene
TR	Technical Report
UIUC	University of Illinois at Urbana-Champaign
URL	Universal Resource Locator
USACE	U.S. Army Corps of Engineers
USAEUR	U.S. Army Europe
USMA	U.S. Military Academy
WWW	World Wide Web

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. REPORT DATE (DD-MM-YYYY)	2. REPORT TYPE	3. DATES COVERED (From - To)
20-05-2008	Final	

4. TITLE AND SUBTITLE
Center for the Advancement of Sustainability Innovations (CASI):
A Summary of the Center's First Year's Activities

5a. CONTRACT NUMBER

5b. GRANT NUMBER

5c. PROGRAM ELEMENT

6. AUTHOR(S)
William D. Goran

5d. PROJECT NUMBER

5e. TASK NUMBER

5f. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
U.S. Army Engineer Research and Development Center (ERDC)
Construction Engineering Research Laboratory (CERL)
PO Box 9005,
Champaign, IL 61826-9005

8. PERFORMING ORGANIZATION REPORT NUMBER
ERDC/CERL SR-08-7

9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)

10. SPONSOR/MONITOR'S ACRONYM(S)

11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION / AVAILABILITY STATEMENT
Approved for public release; distribution is unlimited.

13. SUPPLEMENTARY NOTES

14. ABSTRACT

The Engineer Research and Development Center (ERDC) established the Center for the Advancement of Sustainability Innovations (CASI) as a new capability in fall 2006 to be hosted at the Construction Engineering Research Laboratory (CERL) in Champaign, IL. The goal of CASI is to focus the value of ERDC expertise, technologies, and partnerships on helping the U.S. Army Corps of Engineers (USACE), the Army, and the Department of Defense (DoD) achieve more sustainable facilities and operations. Sustainability innovations from CASI and its partners are measured against the Army Strategy for the Environment's "triple bottom line," of mission, community, and environment. CASI has organized technology focus areas involving domains for which to provide capabilities and expertise relevant to sustainability requirements. In 2007, CASI focused on building relationships and attempting to identify those critical projects that will help shape future Army and USACE activities. This report describes some of these collaborations and details plans for 2008.

15. SUBJECT TERMS
sustainability CASI center of expertise

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			19b. TELEPHONE NUMBER (include area code)
Unclassified	Unclassified	Unclassified	SAR	32	